STUDY MODULE DESCRIPTION FORM

Name of the module/subject	Code
Computerized methods of the power network calculations and	**1010311371010311893**

Field of study	Profile of study (general academic, practical)	Year /Semester
Electrical Engineering	**(brak)**	**4 / 7**
Elective path/specialty	Subject offered in:	Course (compulsory, elective)
Power Networks and Electric Power System	**Polish**	**obligatory**

Cycle of study:	Form of study (full-time,part-time)
First-cycle studies	**full-time**

No. of hours	No. of credits
Lecture: **15** Classes: **-** Laboratory: **-** Project/seminars: **15**	**3**

Status of the course in the study program (Basic, major, other)	(university-wide, from another field)
(brak)	**(brak)**

Education areas and fields of science and art	ECTS distribution (number and %)
technical sciences	**3 100%**

Responsible for subject / lecturer:

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Prerequisites in terms of knowledge, skills and social competencies:

1	**Knowledge**	Basic knowledge in field of power network, power flow and short-circuit calculations. Basic theory of protections, electric machines and electrical equipment.
2	**Skills**	Effective self-education in study field. Skills in basic network calculations of power flow, short-circuits and voltage regulaton.
3	**Social competencies**	Student should have consciousness of necessity of improving his competences in innovation technologies for power engeneering, readiness to work individual and cooperate within groups.

Assumptions and objectives of the course:

Studies of calculation technology for power network analisys in normal and fault conditions. Individual calculations for the real electric objects (substations and networks)

Study outcomes and reference to the educational results for a field of study

Knowledge:

1. Systematic knowledge in normal and failure state analysis of power and distribution networks - [K_W02++]
2. Use knowledge of the votage regulation methods and power flow, short-circuits calculations also in networs with distributed generation. - [KW_24+++]
3. Use knowledge of the calculation methodology for short-cicuit and overload protecion in lines and trasformers.. - [KW_22++]

Skills:

1. Ability to conception design and determine parameters for network secure exploitation. - [K_U10+++, K_U22++]
2. Ability to implementation expert and design tools for determination of parameters for network secure exploitation. - [K_U10+++]

Social competencies:

1. One has an awareness of usage of modern methods for designing and high-class solutions. - [K_K02++]
2. One has an awareness of economic and social acceptance for the choosen technical solution. - [K_K02++]

Assessment methods of study outcomes

- assessment of knowledge and skills on the basis of test consisting on solving of design problem.
- permanent assessment on lectures and projects.

Obtaining additional points activity during lectures and projects, in particular way for:
- activity on classes in any attempt to solving of the problem to solve,
- skill of co-operation in workgroups.

Course description

Computer systems of network calculations. Modelling of the selected HV/MV substation and MV distribution network. Power flow, voltage levels and power losses calculations. Short-circuit calculations for the overload and fault protection. Distributed generation and power line protection settings. Calculations of the network adaptation range for the normal and fault conditions.

Update 2017: Impact of hybrid power plants on the selection of the security settings of distribution line

Applied training methods

Lecture: the theory of the closely related to practice, Multimedia lecture

Project: case study of the real MV distribution network, working in a team

Basic bibliography:

1. Kulczycki J., Optymalizacja struktur sieci elektroenergetycznych, WNT, Warszawa, 1990 r.

2. Zajczyk R.: Zwarcia w układach elektroenergetycznych, Gdańsk, 2005 r.

3. Kahl T..: Sieci elektroenergetyczne, WNT, Warszawa, 1984 r.

4. Praca zbiorowa pod. red. J. Kulczyckiego: Ograniczanie strat energii elektrycznej w elektroenergetycznych sieciach rozdzielczych, Wyd. Polskie Towarzystwo Przesyłu i Rozdziału Energii Elektrycznej, Poznań, 2002 r..

5. Lorenc J.: Admitancyjne zabezpieczenia ziemnozwarciowe, Wyd. PP, Poznań, 2007 r.

Additional bibliography:

1. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Ocena wielokryterialna możliwości przyłączenia jednostek wytwórczych do sieci elektroenergetycznej średniego napięcia. Wiadomości Elektrotechniczne, Warszawa, 2012, 1 - ISSN 0043-5112 ss. 3-8.

2. Thekla N., Boutsika A., Papathanassiou S.A.: Short-circuit calculations in networks with distributed generation. Electric Power Systems Research 2008 No 78.

3. 3. Marszałkiewicz K., Grządzielski I., Trzeciak A.: Impact of Voltage Conditions on Distributed Generation Connctiivity in Medium Voltage Grids. Acta Energetica, 4/25 2015 ISSN 2300-3022

Result of average student's workload

Activity	Time (working hours)
1. Participation in lectures	15
2. Participation in project classes	15
3. Project implementation	30
4. Consultations	5

Student's workload

Source of workload	hours	ECTS
Total workload	65	3
Contact hours	35	2
Practical activities	50	1